

ITEMS

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THE HISTORY OF QUANTIFICATION IN THE SCIENCES:

REPORT ON A CONFERENCE

by Robert K. Merton *

MANY scientists spend time in measuring or in devising means of measuring what they want to understand. This can be taken as an introductory and excessively loose quantitative statement about the place of quantification in the sciences. That the amount of such measuring behavior differs among the sciences at any one time and within each science at various times in its history is another statement of like kind. That the sources, character, and consequences of measurement for the sciences in which it develops have been and still are partly alike and partly different is a third statement that faintly limns the changing role of measurement and, in particular, of quantitative measurement in the development of the sciences. It almost appears that scientific man is the measurer of all things.

Considerations of this kind prompted the Joint Committee on the History of Science, which is under the auspices of the National Research Council and the Social Science Research Council,¹ to plan a conference on the history of quantification in the sciences. Confronted with the uphill task of stimulating research on science as a historically evolving branch of culture, as a social institution, and as an increasingly important source of philosophical ideas, the committee thought it best to arrange a conference on quantification, a delimited though

still vast subject. They thought that by juxtaposing the history in diverse sciences of as important a part of science as quantification, something more could be learned about the historical and social forces that affect, if they do not entirely shape, the nature and functions of measurement in science. By bringing together thumbnail sketches of the course of measurement in a variety of sciences and by confronting the authors of these accounts with one another, the committee believed that something new would be introduced. From the collation there might emerge new kinds of knowledge that would probably not emerge—or not so soon—as long as such accounts were imprisoned within their respective disciplinary premises. In the judgment of the participants in the conference, this is just what did happen.

ORGANIZATION AND PROCEDURE
OF THE CONFERENCE

The conference took place on November 20–21, 1959, at the office of the Social Science Research Council; some thirty scholars took part.² Financial support for the con-

* I am indebted to participants in the conference for help in writing this report: in particular, to Thomas S. Kuhn, A. C. Crombie, and Bernard Barber.

¹ The members of the committee are Richard H. Shryock, American Philosophical Society (chairman); I. Bernard Cohen, Harvard University; Henry Guerlac, Cornell University; Mark H. Ingraham, University of Wisconsin; R. B. Lindsay, Brown University; Robert K. Merton, Columbia University; H. L. Shapiro, American Museum of Natural History; and Gordon R. Willey, Harvard University.

² In addition to Messrs. Cohen, Guerlac, Lindsay, Merton, and Shryock of the Joint Committee, the following scholars were present at the conference: Harry Alpert, University of Oregon; Bernard Barber, Barnard College, Columbia University; Edwin G. Boring, Harvard University; Marshall Clagett, University of Wisconsin; A. C. Crombie, Princeton University; Philip Frank, Harvard University; R. W. Gerard, University of Michigan; David R. Goddard, University of Pennsylvania; Mark Graubard, University of Minnesota; Earl J. Hamilton, University of Chicago; Pendleton Herring, Social Science Research Council; Alexandre Koyré, Institute of Advanced Studies, Princeton; Simon Kuznets, Johns Hopkins University; Thomas S. Kuhn, University of California, Berkeley; Paul F. Lazarsfeld, Columbia University; Daniel Lerner, Massachusetts Institute of Technology; Solomon Pines, Hebrew University, Jerusalem; Derek J. Price, Yale University; Albert C. Spaulding, Na-

ference was provided by the National Science Foundation. The program was organized in four sessions, and two prepared papers were discussed at each session.

In form, the conference largely followed a pattern frequently used by Council committees. The papers—all but two of them—were written and circulated in advance to participants in the conference who, from all indications, read them. In order that no person should be penalized by being forced to attend to administrative details throughout the conference, each of the four sessions had its own chairman. In about 20–25 minutes each author presented the essentials of his paper as well as some second thoughts on it. The written paper and the oral summary furnished the basis for discussion.

The important and, it must be said, surprising fact is that the conference moved into high gear almost from the beginning. It stayed in high gear down to the dwindling moments of the second day. After a mathematician, S. S. Wilks, presented a general orientation toward the nature of quantification, a historian of medieval thought, A. C. Crombie, found himself in the odd but appreciated position of helping conferees to detect developments in quantification in recent and contemporary social science comparable to what his analysis showed to be the role of “quantifying concepts,” as distinct from actual measurements, in medieval physics. This first session set the tone for the rest of the conference: pointed, informed discussion in which each participant drew upon his distinctive fund of knowledge, which was often linked by him or by others with parallels drawn from other, often intellectually remote, disciplines.³

It should perhaps be explained why this feature of the conference is described as surprising. After all, the participants were a conglomerate crew: nine historians of science (some of whom had been or also remained physicists and chemists), two philosophers, one political scientist, one psychologist, two biologists, three physicists, five sociologists, three economists, two anthropologists, and a mathematician. The conference had all the makings of a well-intentioned enterprise that might quickly decline into a babel of tongues. The members of the organizing committee knew of this danger; the participants

knew it; and the sponsoring Councils knew it. That may be one reason why it did not happen. Each participant was moved to make a special effort to say what he wanted to say in a way that could be understood by all the others. It is a fact that at no point in the public discussion (and so far as your reporter can tell, never in the conversation at lunch and in the evenings) did anyone find occasion to complain that he was being excluded from understanding by a smoke screen of jargon. There was, of course, the proper use of technical language peculiar to each discipline; to have done entirely without technical terminology would have meant treating a difficult subject in hopelessly vague terms. But the participants abstained from the use of jargon in its strict sense: the misplaced use of would-be technical terminology so that it confounds and obscures rather than instructs.

The absence of jargon was the avoidance of a fault, not the ensurance of merit. Beyond this, it seems, was the positive value of having scholars from the several sciences focus on a problem variously common to them all and doing so from the perspective of their own discipline. There was no deliberate effort in this conference to stress its interdisciplinary aspects in the tacit belief that a togetherness of men with diverse intellectual antecedents is a good thing in its own right. It was assumed that the collaboration of those having different bodies of knowledge was indispensable in order to understand the course taken by quantification in the several sciences. As a result, little time was given to general explanations of the distinctive intellectual scope and character of the many disciplines represented in the conference. Instead, the similarities and differences between quantification in these varied fields were repeatedly exhibited in the substantive work being done in the conference.

Contributing further to the effectiveness of the conference was the obvious and important fact that the principal speakers had taken care in preparing their papers. There was little here of what often, and understandably, turns up in conferences that take men away from their current intellectual concerns—the writing of perfunctory rather than serious papers for the occasion.

In the opinion of the reporter, it was crucially important that each of the authors of the principal papers had been selected only for his knowledge of the subject assigned to him and not because he happened to occupy an academic post assumed to qualify him to do the job that was needed. As a result, there was a substantial age-spread among those giving the papers. One author had taken his doctorate within the decade; another could include much “oral history” based on his direct experience for almost half a century with quantification in his discipline. The overlapping of academic generations among the speakers and other participants as well did much, it

tional Science Foundation; Joseph J. Spengler, Duke University; M. H. Trytten, National Research Council; Charles F. Voegelin, Indiana University; S. S. Wilks, Princeton University; Harry Woolf, *ISIS*, University of Washington.

³ The papers discussed at the second session were “The Function of Measurement in Modern Physical Science,” by Thomas S. Kuhn, and “Quantification in Chemistry,” by Henry Guerlac; at the third session, “The History of Quantification in Medical Science,” by Richard H. Shryock, and “The Beginning and Growth of Measurement in Psychology,” by Edwin G. Boring; at the final session, “On the Progress of Quantification in Economics,” by Joseph J. Spengler, and “Observations and Materials on the History of Quantification in Sociology,” by Paul F. Lazarsfeld.

seems in retrospect, to help convert the group of thirty men into a working seminar rather than requiring most of them to remain a captive, and uncaptivated, audience.

Perhaps the public collation of ideas drawn from many different disciplines and focused on a subject of particular interest to all, the use of a common language rather than of private idiom, the good fortune of having the principal papers produced with care by informed and interested minds, the energetic interchange in the discussion that did not dwell on or implicitly allude to the pecking order (sometimes called the hierarchy) of the sciences in our culture today, all these may not be enough to explain why the conference turned out to be a most profitable, informative, and stimulating two days. But whatever the causes, the fact itself seems reasonably well established. An aggregate of about thirty scholars entered upon the conference with some hope and many misgivings; they left as a reasonably cohesive group, not merely edified but instructed by the exchange of ideas and information and by the new ideas emerging from that exchange.

The major result of the conference, in the opinion of the reporter, was a growing recognition that it is useful to fuse the history of science and the sociology of science into a sociological history of science. Instead of cleaving to the traditional doctrine that there were and must continue to be only the two distinct specialties, the participants became progressively aware that this was not so. The historian of science was at least implicitly and often in so many words drawing on sociological concepts and findings in order to interpret the historical facts of the case. And what was evident from the beginning, the sociologist of science could go about his business only if he took sufficient account of the historical contexts in which one or another kind of social organization of science or one or another set of scientific ideas came into being, was retained and supported, or dropped from sight. The specializations of course continue to have their distinctive purposes and utility. But beyond these, there appeared in the conference a definite sign that they can be (inasmuch as they had been) fruitfully merged into a sociological history of science.

SELECTED OBSERVATIONS

Only a few ideas set forth in the conference can be summarized here. It was noted that often prolonged periods of qualitative observation and thought have (perhaps necessarily) preceded quantitative thought and observation in each of the sciences. What is more, as we see from medieval physics or from nineteenth-century sociology, quantitative concepts emerge long before it occurs to men to make actual measurements. Medieval theorems

in physics, for example, were quantitative in form but qualitative in content. The scholastic analysts of motion apparently did not make a basic distinction between qualitative and quantitative laws in science. Only by the seventeenth century, it seems, did "the dialogue" between quantified concepts and actual measurement begin to move toward a phase of maturity, although this appears not to have become thoroughgoing until the latter part of the eighteenth century.

In that period chemistry, unlike physics, used its measurements, chiefly of properties of substances and their reactions, to arrive at more precise classifications. This use of measurement is found in other fields, such as medicine and the social sciences, at various phases in their history. The essential point is that not everything described in terms of metrics is necessarily used to formulate quantitatively expressed uniformities or laws.

Lively discussion followed the formulation of the idea that the difficult notion of "reasonable agreement" between theory and actual observation in science was a long time developing (and is still to come in some of the social sciences). Since exact agreement is unachievable, some consensus about reasonable or satisfactory agreement of theory and observation is required on the part of the scientific community. When the consensus is disturbed and at least some scientists come to regard certain discrepancies between observation and theory as unreasonable, as intolerable, then "abnormal situations" or "crisis states" occur in that science. This condition then leads some scientists, and later more of them, to demand a basic revision of theory, for plainly "something has gone wrong." In this view, quantification serves a major function in the development of scientific theory; for the most obtrusive of all crises in a science occurs when *quantified* observations come to be regarded as significantly discrepant with theoretical expectation. The quantitative anomaly, unlike many qualitative ones, cannot be easily evaded. As a result, the anomalous discrepancy presses for a fundamental revision of scientific theory.

At no single time in the history of a science do we find the sudden appearance of the entire complex of quantification: the quantitative concept, the methodical matching of actual measurements with theoretical expectation, the concept of reasonable agreement or of approximations in measurement, the jettisoning of the idea that measurements are either absolutely true or absolutely false, the consensus among scientists that certain discrepancies between theory and quantitative observation can be of such magnitude that they require a recasting or discarding of the theory. Only in the sixteenth and seventeenth centuries, for example, did astronomers begin to make systematic and general quantitative observations as distinct from sporadic ones or others centered on par-

ticular phenomena. Moreover, scientists tended to regard the numbers attached to observations as absolutely established, not yet having matter-of-factly incorporated into their thinking the notion of experimental or observational error. It is of no great consequence to decide whether Boyle or Mersenne before him was the first to give the numbers he obtained through actual measurement *and* to base his generalizations upon them, even though they did not exactly fit the generalization. The appearance of this kind of thinking marked a basic change in the role of quantification in science.

In many of the sciences—the medical and social, for example—the difficulty of defining units of measurement long delayed the systematic use of quantification. One value of taxonomies is that they sometimes serve as a prelude to the definition of units that is essential even for limited quantification. In science, and conspicuously though far from exclusively so in the social sciences, there is also the great difficulty that the operations employed to measure often modify the state of that which is being measured—whether this involves taking the pulse rate of a patient, or interviewing a psychological subject, or, as in the “Hawthorne effect,” setting up a sociological experiment.

With suitable (and sometimes, great) modification, aspects of the development of quantification in the physical and life sciences are matched in the history of the social sciences. The early checkered career of quantification in those fields included the phase of descriptive statistics, gingerly used in political and moral arithmetic, and the early efforts to apply probability theory to human behavior. A big step forward occurred with the use of statistical measures designed to bear on theoretical issues rather than continuing exclusively the older practice of trying to make do with the social, demographic, economic, and political statistics that happened to be collected for the purposes of social bookkeeping. And just as eighteenth-century chemists tried to find quantitative measures to describe chemical substances more precisely than before, so have early social scientists tried to characterize social formations quantitatively—as exemplified by Niceforo's attempt to find indexes of “a civilization.”

These few paragraphs with their scattered content may be enough to give an inkling of the repeated cross references in the conference to the history and functions of quantification in the several sciences. Throughout the discussion, as well, apposite observations were made on the ways in which the social roles assigned each of the sciences at various times in their history have affected the use (or nonuse) of quantification. But since these details will appear in the published proceedings of the conference, nothing more is said about them here.

PROCEEDINGS TO BE PUBLISHED IN *ISIS*

Not a few of the participants expressed the thought that if a conference of this sort could accomplish what they believed to be so much in so little time, a more extended seminar might do a great deal to advance needed work on the sociological history of science. As an immediate step in this direction, arrangements were made for publication of the proceedings of the conference. The papers will be published reasonably soon as a special issue of *ISIS*, the official journal of the History of Science Society.

It may be of interest to other committees of the sponsoring Councils or of other organizations to describe the plan for publication as this evolved during a discussion on the second day when the participants, still fired with enthusiasm over the occasion, proved unwilling to confine lunch to a gastronomic event or to the small talk that ordinarily takes place around a luncheon table. After dessert, the participants constituted themselves a meeting of the whole. It was agreed that the prepared papers would be revised and that the learning that everyone thought had been gained during the conference (not least of all, by the scheduled speakers themselves) would be incorporated in the revisions. This was to be done in a particular way, designed to remind the participants and to inform the readers who were not present at the conference just what the discussion itself had contributed to the thinking and knowledge of the participants. The original papers would be published, except for minor editorial improvements, as they were written. At appropriate places throughout each paper, however, would be interpolations, clearly distinguished from the original text, of the new ideas and the connections between the substance of the several papers that had turned up in the course of the conference. Furthermore, since some of these ideas and comparisons bore not so much on a particular point but on one or another of the main themes of a paper, these would be assembled by each author in an appendix to his paper. In this way the published proceedings would avoid the textbooklike distortions in which a final report appears as a seamless web of thought, woven of ideas that were all there from the beginning. Instead, the publication would show the way in which modifications, extensions, comparisons, and second thoughts resulted from the conference by setting them apart in special typeface.

Finally, included in the proceedings will be a paper written to bring out some of the many historical and sociological parallels and differences between the sequences and patterns of quantification and measurement that have developed or are developing in the several

sciences, so far as these can be discerned in the original papers and in the discussion based on them.

CONCLUSION

Little has been said in this report of the principal ideas, problems, formulations, and suggestions for further research set forth in the conference. The omission is by intent, for the substance of the meeting will be found in the proceedings. This report is designed only to convey some rough impression of how the conference looked to those who took part in it. Whatever else may develop from the conference, it was plain to the partici-

pants, drawn from disciplines under the aegis of the National Research Council and the Social Science Research Council, that there is need for a more intensive and extensive program of research on the sociological history of science. This is essential for an understanding of our age of science and for an understanding of how we came to be where we are in each of the sciences. If the momentum induced by this conference is not dissipated in inaction, perhaps we shall in due course rid ourselves of the anomaly that in a world where everyone knows science to be one of the great social institutions of our time, so little concerted effort is being put into the sociological history of science.

COMMITTEE BRIEFS

POLITICAL BEHAVIOR

David B. Truman (chairman), William M. Beaney, Robert A. Dahl, Oliver Garceau, V. O. Key, Jr., Avery Leiserson, Edward H. Levi, Dayton D. McKean; *staff*, Bryce Wood.

The committee has completed plans for a conference on research on metropolitan leadership to be held at Northwestern University, April 1-3, 1960, in collaboration with York Willbern of Indiana University, who is coordinator of a number of studies of metropolitan action programs supported by the Ford Foundation, and with the Center for Metropolitan Studies at Northwestern. The conference will consider relationships between theory and research on metropolitan leadership, with a view toward bringing theory and data closer together in this area. Papers discussing theoretical implications of their authors' field research will be prepared by Robert A. Dahl and Herbert Kaufman of Yale University, Norton E. Long of Northwestern University, and Peter H. Rossi of the University of Chicago. In addition to members of the committee and others, participants will include persons engaged in research on metropolitan action

programs and recipients of the committee's grants for research on American governmental and legal processes.

SIMULATION OF COGNITIVE PROCESSES

Herbert A. Simon (chairman), John W. Carr, III, Carl I. Hovland, George A. Miller.

Continuing its efforts to increase social scientists' competence in research using electronic computers to simulate human thinking, the committee has provided funds to aid new programs at the University of Rochester and the University of North Carolina. At the University of Rochester a series of lectures on nonnumeric uses of computers has been organized by Vincent Nowlis, Professor of Psychology, and Thomas Keenan of the University's Computing Center, to acquaint members of the faculty with the use of simulation techniques. At the University of North Carolina the grant from the committee is to help support the investigation and development of information processing languages oriented toward problems in the social sciences and, in particular, problems in the study of cognitive processes.

PERSONNEL

DIRECTORS OF THE COUNCIL

The following persons have been designated by the seven national social science organizations associated with the Council to serve as directors of the Council for the three-year term 1960-62:

Melford E. Spiro, University of Washington, by the American Anthropological Association

William H. Nicholls, Vanderbilt University, by the American Economic Association

David M. Potter, Yale University, by the American Historical Association

David B. Truman, Columbia University, by the American Political Science Association

Nevitt Sanford, University of California, Berkeley, by the American Psychological Association

Wilbert E. Moore, Princeton University, by the American Sociological Association

Harold F. Dorn, National Institutes of Health, by the American Statistical Association.

The credentials of the new members are scheduled for acceptance by the board of directors of the Council at its spring meeting in New York on March 18-19, 1960.

FACULTY RESEARCH FELLOWSHIPS

The Committee on Faculty Research Fellowships—William H. Nicholls (chairman), M. Margaret Ball, Irving L. Janis, Joseph J. Mathews, George E. Mowry, and John Useem—held the first of its two meetings scheduled for 1959–60 on December 10–11. It voted to award 20 fellowships under the new program, which supplants the former program of the same title and the previous program of Faculty Research Grants:

Paul J. Alexander, Professor of History, University of Michigan, for research in Europe on the apocalyptic thought of the Byzantine Empire.

Robert E. Baldwin, Associate Professor of Economics, University of California, Los Angeles, for research in the United States, Great Britain, and Africa on the impact of the copper industry on the economic development of Northern Rhodesia.

William G. Bowen, Assistant Professor of Economics, Princeton University, for research in Great Britain on the criteria used in England to determine the total national expenditure on higher education and the allocation of these funds.

Robert S. Hoyt, Professor of History, University of Minnesota, for research in England on the Domesday Book and other texts as they bear on Anglo-Norman administrative and constitutional development, 1066–1135.

Gabriel Jackson, Assistant Professor of History, Wellesley College, for research in Spain and other European countries on the Spanish Republic and Civil War.

Robert A. Kann, Professor of History, Rutgers University, for research on political restoration in the history of modern Europe.

*Robert E. Kuenne, Assistant Professor of Economics, Princeton University, for research in Great Britain, France, and Italy on general equilibrium economics.

David S. Landes, Professor of History and Economics, University of California, Berkeley, for research in Europe on the history of the Bleichröder bank (joint project with Fritz Stern) and a comparative history of the industrial revolution in Western Europe (renewal of Faculty Research Grant awarded in 1958–59).

J. Gus Liebenow, Assistant Professor of Government, Indiana University, for research in Europe and Africa on a comparison of political and administrative leadership in Liberia and Sierra Leone.

Arthur Maass, Professor of Government, Harvard University, for research in Spain, Morocco, Algeria, and southern France on the comparative development of water rights and water law.

*Arno J. Mayer, Assistant Professor of History, Harvard University, for research in the United States, England, and France on Versailles in perspective: a study of the politics and diplomacy of peacemaking, 1918–20.

John J. Murray, Professor of History, Coe College, for research in Europe on the influence of the Flemish Low Countries on England, 1500–1700.

Irene D. Neu, Associate Professor of History, Southeast Missouri State College, for research in the United States and Canada on Edmond John Forstall (1794–1873): a study of personality in economic development.

*Declined award.

Edith T. Penrose, Lecturer and Research Associate in Economics, Johns Hopkins University, for research in the United Kingdom and the Netherlands on investment policies of international firms and economic growth of underdeveloped countries.

Karl P. Polanyi, Visiting Professor of Economics, Columbia University, for comparative and developmental studies of economic institutions in early societies (renewal of Faculty Research Grant awarded in 1958–59).

Milton Rokeach, Professor of Psychology, Michigan State University, for a study of three delusional Christs in a mental hospital.

Mark R. Rosenzweig, Associate Professor of Psychology, University of California, Berkeley, for research in France on psycholinguistics.

Arthur Schweitzer, Professor of Economics, Indiana University, for research on the Nazi economic system (renewal of Faculty Research Grant awarded in 1958–59).

Fritz Stern, Associate Professor of History, Columbia University, for research in Europe on the history of the Bleichröder bank, with particular emphasis on its political role in 1860–90 (joint project with David S. Landes).

James H. Young, Professor of History, Emory University, for research on efforts to oppose and control medical quackery in the present century.

GRANTS-IN-AID

The Committee on Grants-in-Aid—Vincent H. Whitney (chairman), James M. Buchanan, John Hope Franklin, William H. Riker, Melford E. Spiro, and Gordon Wright—held the first of its two meetings scheduled for 1959–60 on December 14–15. It voted to award 20 grants-in-aid of research, under the continuing program first offered by the Council in 1927:

Keith B. Berwick, Instructor in History, University of California, Los Angeles, for a case study of power, policy, and leadership in Virginia, 1763–89 (joint project with Jack P. Greene).

Arthur R. Cohen, Associate Professor of Psychology, New York University, for research in Israel on national background as a predispositional determinant of cognitive dissonance.

Albert Eglash, Assistant Professor of Psychology, Washington College, for research on coping with social rejection of ethnic or institutional groups.

Robert A. Ellis, Assistant Professor of Sociology, Stanford University, for research on social differences in the academic success of college undergraduates.

Ving Ellis, Associate Psychiatrist, Department of Psychological Medicine, University of California, Berkeley, for research on the relation of personality to college teaching performance (joint project with Joseph Katz).

Gilbert C. Fite, Research Professor of History, University of Oklahoma, for research on governmental response to western agricultural crises in the late nineteenth century.

E. Franklin Frazier, Professor of Sociology, Howard University, for further research on the Negro family in the United States.

Milton M. Gordon, Visiting Associate Professor of Sociology, Wellesley College, for a study of the Girard College case and its implications for law, social science, and race relations in the United States.

H. A. John Green, Special Lecturer in Economics, University of Toronto, for research towards a general theory of aggregation in economics.

Jack P. Greene, Assistant Professor of History, Western Reserve University, for a case study of power, policy, and leadership in Virginia, 1763-89 (joint project with Keith B. Berwick).

Francis G. James, Professor of History, Tulane University, for research in Ireland and England on Ireland and the Old Empire, 1688-1782 (renewal).

Joseph Katz, Professor of Philosophy, Vassar College (on leave of absence at University of California, Berkeley), for research on the relation of personality to college teaching performance (joint project with Ving Ellis).

Charles L. Leven, Assistant Professor of Economics and Regional Science, University of Pennsylvania, for research on use of social accounting techniques in the analysis of urban land requirements.

Arthur J. Marder, Senior Professor of History, University of Hawaii, for research in the United Kingdom on British naval history, 1914-19.

Jacob Mincer, Assistant Professor of Economics, The City College, New York, for research on the family economic context of labor force participation.

James A. Robinson, Visiting Assistant Professor of Political Science, Northwestern University, for research on conditions for Congressional initiative in formation of foreign policy.

*George E. Simpson, Professor of Sociology and Anthropology, Oberlin College, for research in Jamaica and Trinidad on religious cults in Trinidad.

James M. Smith, Lecturer in History, College of William and Mary, for research on the Kentucky and Virginia Resolutions and the development of the American civil liberties tradition.

Clark C. Spence, Assistant Professor of History, Pennsylvania State University, for research on the American mineral frontier, 1849-90, and the impact of capital, skilled labor, and new techniques from other areas.

Everett K. Wilson, Professor of Sociology, Antioch College, for research on the nature of anthropological and sociological theory, with special reference to the empirical research stimulated by Durkheim.

GRANTS FOR RESEARCH ON AMERICAN GOVERNMENTAL AND LEGAL PROCESSES

The Committee on Political Behavior—David B. Truman (chairman), William M. Beaney, Robert A. Dahl, Oliver Garceau, V. O. Key, Jr., Avery Leiserson, Edward H. Levi, and Dayton D. McKean—at its meeting on January 16 awarded 9 grants for research under its broadened program:

Peter B. Clark, Assistant Professor of Political Science, Yale University, for research on the influence of major businessmen on public policy formation in selected metropolitan areas.

* Declined award.

Richard F. Fenno, Jr., Assistant Professor of Political Science, University of Rochester, for research on legislative behavior and interaction of the legislative and executive branches in the appropriations process.

John H. Fenton, Professor of Government, University of Massachusetts, for research on politics in certain Midwestern states.

Herbert Garfinkel, Associate Professor of Political Science, Michigan State University, for research on national leadership for civil rights: a case study of organizational politics.

Yale Kamisar, Professor of Law, University of Minnesota, for research on the criminal law in action: the prosecutor's discretion.

Gladys M. Kammerer, Professor of Political Science, University of Florida, for research on community political stability and city-manager tenure.

Donald G. Morgan, Professor of Political Science, Mount Holyoke College, for research on the responsibility of Congress for considering constitutional questions and the manner of its exercise.

Walter F. Murphy, Assistant Professor of Politics, Princeton University, for research on the Supreme Court in the American political system.

James Q. Wilson, Instructor in Political Science, University of Chicago, for a comparative study of political involvements of institutions in local communities.

GRANTS FOR RESEARCH ON NATIONAL SECURITY POLICY

The Committee on National Security Policy Research—William T. R. Fox (chairman), Charles J. Hitch, Charles P. Kindleberger, Klaus Knorr, G. A. Lincoln, John W. Masland, Robert E. Osgood, and Arthur Smithies—at its meeting on January 25 awarded 3 grants under its new program to encourage research on economic aspects of its field:

Robin D. S. Higham, Instructor in History, University of North Carolina, for research on the British armed forces in peacetime, 1918-40.

Irving B. Kravis, Professor of Economics, University of Pennsylvania, for research in France and the United States on an assessment of burden sharing in international economic affairs, with special reference to cooperative defense measures.

Laurence W. Martin, Assistant Professor of Political Science, Massachusetts Institute of Technology, for a comparative study in the United Kingdom of opposition and innovation in national security policy, with particular reference to British and American experience.

GRANTS FOR SLAVIC AND EAST EUROPEAN STUDIES

The Subcommittee on Grants—Chauncy D. Harris (chairman), Deming Brown, Evsey D. Domar, Henry L. Roberts, and Donald W. Treadgold—of the Joint Committee on Slavic Studies, which is co-sponsored by the American Council of Learned Societies and the Social Science Research

Council, met on December 21. The subcommittee awarded 17 grants for research:

- Gustave Alef, Assistant Professor of History, University of Oregon, for research on political, religious, and economic developments in Muscovy, 1462-1505.
- Morris Bornstein, Assistant Professor of Economics, University of Michigan, for research in the Soviet Union on the Soviet price system.
- Edward J. Brown, Professor of Russian, Brown University, for research on the Moscow student circle of the 1830's.
- David Djaparidze, Visiting Professor of Medieval Russian History, Indiana University, for research in the United States and Western Europe on a guide to the study of old Russian texts.
- Stephen A. Fischer-Galati, Assistant Professor of History, Wayne State University, for research on the tradition of revolution in the Balkans.
- Eric P. Hamp, Associate Professor of Linguistics, University of Chicago, for research in Europe on Albanian linguistics.
- Franklyn D. Holzman, Professor of Economics, University of Washington, for a comparative study of the role of foreign trade in Soviet and American growth.
- Naum Jasny, Soviet Economic Study Group, Washington, D. C., for research on the Soviet economy after Stalin.
- Charles Jelavich, Associate Professor of History, University of California, Berkeley, for research in Eastern Europe on Yugoslav nationalism.
- Howard Kaminsky, Assistant Professor of History, University of Washington, for research in Eastern Europe on the Hussite revolution, 1415-25.
- Alexander Lipski, Assistant Professor of History, Long Beach State College, for research on Ivan N. Boltin, Russian historian of the Enlightenment.
- Arthur P. Mendel, Associate Professor of Russian History, New York University, for research in the Soviet Union on Russian social and cultural history, 1907-14.
- Richard E. Pipes, Associate Professor of History, Harvard University, for research in Europe on the political and social thought of Peter Struve.
- Stavro Skendi, Assistant Professor of Albanian and Balkan Slavic, Columbia University, for research on the Albanian national awakening, 1878-1912.
- Gleb Struve, Professor of Slavic Languages and Literatures, University of California, Berkeley, for research in Europe on Russian literature in exile.
- Lawrence L. Thomas, Assistant Professor of Slavic Languages and Literatures, University of California, Berkeley, for research in the United States and Poland on Polish literary policy and polemics, 1946-51.
- Serge A. Zenkovsky, Associate Professor of History and Political Science, Stetson University, for research in Finland on capitalists and capitalist organizations in Russia, 1857-1917.

GRANTS FOR RESEARCH ON THE NEAR AND MIDDLE EAST

The Joint Committee on the Near and Middle East—T. Cuyler Young (chairman), Hamilton A. R. Gibb, Majid Khadduri, Dankwart A. Rustow, William D. Schorger, Wil-

fred C. Smith, and G. E. von Grunebaum—at its meetings on December 14 and February 13 awarded 9 grants for research in the social sciences and the humanities in the modern period, under the broadened program now offered by the American Council of Learned Societies and the Social Science Research Council:

- Mark J. Dresden, Associate Professor of Oriental Studies, University of Pennsylvania, for research in Iran on Iranian languages, history, and culture.
- Andrew S. Ehrenkreutz, Assistant Professor of Near Eastern Studies, University of Michigan, for research in England, France, and the Near East on the economic history of the Near East in the Middle Ages.
- Allan W. Eister, Associate Professor of Sociology, Wellesley College, and Visiting Professor of Sociology (1959-60), University of Karachi, Pakistan, for replication in West Pakistan of studies of the mass media and related factors in the modernization process.
- Laurence Evans, Diplomatic Historian, Department of State, for research in Europe and the Middle East on United States policy on Syria and Lebanon, 1917-46.
- Eva Hirsch, Lecturer in Economics, College of William and Mary, for research in Turkey on the distribution of nonagricultural income in that country.
- Scott D. Johnston, Professor of Political Science, Hamline University, for research in Israel on its political party system.
- John B. Kelly, Associate Professor of History and Political Science, Ohio Wesleyan University, for research in England and France on a political and diplomatic history of Great Britain and Persia, 1798-1914.
- Donald N. Wilber, Ph.D. in architecture, Princeton University, for a biography of Reza Shah, ruler of Iran, 1925-41, with emphasis on his impact on the character of Iranian society (renewal).
- I. William Zartman, Ph.D. in international relations, Yale University, for research in Morocco on decision making in Moroccan government since independence.

GRANTS FOR ASIAN STUDIES

The Joint Committee on Asian Studies, of the American Council of Learned Societies and the Social Science Research Council—John A. Pope (chairman), W. Norman Brown, Fred Eggan, L. Carrington Goodrich, Rodger Swearingen, and Robert E. Ward—at its meeting on January 9 made awards to 15 scholars:

- James I. Crump, Jr., Associate Professor of Chinese, University of Michigan, for research on fiction from the *Chan-kuo Ts'uei*: its use and influence on later creative writing in Chinese.
- John De Francis, Assistant Professor of Mathematics, Quinnipiac College, for study of Chinese mathematics (renewal).
- Frank H. Golay, Associate Professor of Economics, Cornell University, for a comparative study of economic nationalism in Malaya and the Philippines.
- Merrill R. Goodall, Associate Professor of Asian Studies and Government, Claremont Graduate School and

Pomona College, for research on administrative institutions and leadership in Nepal.

Joel M. Halpern, Assistant Professor of Anthropology, University of California, Los Angeles, for research on rural-urban contacts and culture change among the ethnic groups of northern Laos.

Hyman Kublin, Associate Professor of History, Brooklyn College, for a study of the reluctant rebel: the life of Sen Katayama.

William W. Lockwood, Professor of Public and International Affairs, Princeton University, for research on the politics of industrialization in Asia: interactions between the process of economic development and the democratization of political institutions.

Karl H. Menges, Professor of Altaic Philology, Columbia University, for research in Tungus and its position within related and neighboring languages.

Henry Orenstein, Assistant Professor of Sociology and Anthropology, Tulane University, for research on industrialization and the extended family in India.

Edward H. Schafer, Professor of Oriental Languages, University of California, Berkeley, for research on medieval Chinese civilization: nature and technics in T'ang life, literature, and thought.

Donald H. Shively, Associate Professor of Oriental Languages, University of California, Berkeley, for research on Japanese cities at the end of the seventeenth century.

Kenneth Starr, Curator of Asiatic Archaeology and Ethnology, Chicago Natural History Museum, for a study of "rubblings"—their research values, materials and techniques, and bibliographic processing.

E-Tu Zen Sun, Research Fellow, Center for East Asian Studies, Harvard University, for research on the pattern of development of mineral resources in pre-modern and modern China, and its relation to the Chinese economy.

S. Y. Teng, Professor of History, Indiana University, for completion of a volume on recent Japanese studies on Japan and the Far East.

Robert Van Niel, Associate Professor of History, Russell Sage College, for research on the cultivation system on Java, 1830-70.

INTERNATIONAL CONFERENCE TRAVEL GRANTS

At meetings on January 16, the Committee on International Conference Travel Grants—Mortimer Spiegelman (chairman), Robert C. Angell, Lee J. Cronbach, Hugh L. Elsbree, Frederic C. Lane, John Perry Miller, and Edward H. Spicer—and its several subcommittees made 90 awards to assist social scientists resident in the United States to attend international congresses to be held abroad in 1960:

International Congress of Americanists *International Union of Anthropological and Ethnological Sciences*

Travel grants for the International Congress of Americanists in Vienna on July 15-25, and for the Congress of the International Union of Anthropological and Ethnological Sciences in Paris on July 31 - August 7, were awarded by a

subcommittee consisting of Edward H. Spicer (chairman), George P. Murdock, and H. L. Shapiro.

The grants to the following 5 scholars are for attendance at both meetings:

A. Irving Hallowell, Professor of Anthropology, University of Pennsylvania

Melville J. Herskovits, Professor of Anthropology, Northwestern University

Dorothy L. Keur, Professor of Anthropology, Hunter College

Henry B. Nicholson, Assistant Professor of Anthropology, University of California, Los Angeles

D. L. Olmsted, Associate Professor of Anthropology, University of California, Davis

The grants to the following 3 scholars are for travel to the International Congress of Americanists:

Ralph L. Beals, Professor of Anthropology and Sociology, University of California, Los Angeles

Charles E. Dibble, Professor of Anthropology, University of Utah

Ozzie G. Simmons, Associate Professor of Anthropology, Harvard University

The grants to the following 4 scholars are for travel to the Congress of the International Union:

Dell H. Hymes, Assistant Professor of Social Anthropology and Linguistics, Harvard University

Benjamin D. Paul, Associate Professor of Anthropology, Harvard University

Absolom Vilakazi, Assistant Professor of Anthropology and African Cultures, Hartford Seminary Foundation

Evon Z. Vogt, Professor of Anthropology, Harvard University

International Congress of Economic History *International Congress of Historical Sciences*

Travel grants for the International Congress of Economic History and for the International Congress of Historical Sciences, to be held in Stockholm on August 17-18 and August 21-28, respectively, were awarded by a subcommittee consisting of Frederic C. Lane (chairman), Henry B. Hill, Robert R. Palmer, John E. Sawyer, and Arthur P. Whitaker.

The grants to the following 5 scholars are for attendance at both meetings:

Rondo E. Cameron, Associate Professor of Economics and History, and Director, Graduate Program in Economic History, University of Wisconsin

Shepard B. Clough, Professor of European Economic History, Columbia University

Herbert Heaton, Professor-emeritus of History, University of Minnesota, and Distinguished Visiting Professor, Pennsylvania State University

David S. Landes, Professor of History and Economics, University of California, Berkeley

Robert S. Lopez, Professor of History, Yale University

The grants to the following 3 scholars are for attendance at the International Congress of Economic History:

- Bert F. Hoselitz, Professor of Social Sciences, University of Chicago
Edgar A. J. Johnson, Visiting Professor of European Studies, School of Advanced International Studies, Johns Hopkins University
Melvin W. Reder, Professor of Economics, Stanford University

The grants to the following 33 scholars are for attendance at the International Congress of Historical Sciences:

- Bernard Bailyn, Associate Professor of History, Harvard University
Harry Bernstein, Professor of History, Brooklyn College
Woodrow Borah, Professor of Speech, University of California, Berkeley
Robert F. Byrnes, Professor of History and Director, Russian and East European Institute, Indiana University
Lynn M. Case, Professor of European History, University of Pennsylvania
William F. Church, Professor of History, Brown University
Thomas C. Cochran, Professor of History, University of Pennsylvania
Henry S. Commager, Professor of American History and American Studies, Amherst College
John S. Curtiss, Professor of History, Duke University
Bailey W. Diffie, Professor of History, The City College, New York
Ernst Ekman, Assistant Professor of History, University of California, Riverside
Walter Galenson, Professor of Industrial Relations, University of California, Berkeley
Dietrich Gerhard, Professor of History, Washington University, and Director of the Institute for American Studies, University of Cologne
John P. Gillin, Professor of Anthropology, University of Pittsburgh
Gordon Griffiths, Associate Professor of History, University of Washington
Earl J. Hamilton, Professor of Economics, University of Chicago
Hajo Holborn, Professor of History, Yale University
Robert A. Kann, Professor of History, Rutgers University
Walther Kirchner, Professor of History, University of Delaware
Hans Kohn, Professor of History, The City College, New York
William L. Langer, Professor of History, Harvard University
Owen Lattimore, Lecturer in History, Johns Hopkins University
Rayford W. Logan, Professor of History, Howard University
J. Russell Major, Associate Professor of History, Emory University

- George L. Mosse, Professor of European Intellectual History, University of Wisconsin
Carlton C. Qualey, Professor of American History, Carleton College
Bernadotte E. Schmitt, Emeritus Professor of Modern History, University of Chicago
Carl E. Schorske, Professor of History, Wesleyan University
Franklin D. Scott, Professor of History, Northwestern University
Richard H. Shryock, Librarian, American Philosophical Society, and Professor of History, University of Pennsylvania
Walter M. Simon, Associate Professor of History, Cornell University
John L. Snell, Jr., Professor of History, Tulane University
Donald E. Worcester, Professor of History, University of Florida

International Geographical Union

Travel grants for attendance at the meetings of the International Geographical Union and the International Geographical Congress, to be held in Stockholm, August 6-13, 1960, were awarded by a subcommittee consisting of Arch C. Gerlach (chairman), Stephen B. Jones, and Guido G. Weigend. The 9 recipients are:

- John P. Augelli, Associate Professor of Geography, University of Maryland
S. Earl Brown, Assistant Professor of Geography, Ohio State University
Alden Cutshall, Professor of Geography in Social Sciences, University of Illinois, Chicago
William L. Garrison, Professor of Geography, University of Washington
L. A. Peter Gosling, Assistant Professor of Geography, University of Michigan
Richard Hartshorne, Professor of Geography, University of Wisconsin
Hildegard B. Johnson, Professor of Geography, Macalester College
Aloys A. Michel, Assistant Professor of Geography, Yale University
Malcolm A. Murray, Associate Professor of Geography, Miami University

International Union of Scientific Psychology

Travel grants for attendance at the Congress of the International Union of Scientific Psychology, to be held in Bonn, July 31 - August 6, were awarded by a subcommittee consisting of Lee J. Cronbach (chairman), E. Lowell Kelly, and Robert L. Thorndike. The 17 recipients of awards are:

- Anne Anastasi, Professor of Psychology, Fordham University
Harold Basowitz, Associate Professor of Psychology, College of Medicine, State University of New York at Syracuse

Raymond A. Bauer, Ford Foundation Visiting Professor, Harvard Graduate School of Business Administration

Edward S. Bordin, Professor of Psychology, University of Michigan

Yvonne Brackbill, Research Fellow, Department of Psychology, Johns Hopkins University

Urie Bronfenbrenner, Professor of Child Development and Family Relationships, Cornell University

Roger W. Brown, Associate Professor of Psychology, Massachusetts Institute of Technology

Henry P. David, Chief Psychologist and Psychology Consultant, New Jersey State Department of Institutions and Agencies

Susan M. Ervin, Assistant Professor of Speech, University of California, Berkeley

Cyril M. Franks, Director, Psychology Service and Research Center, New Jersey Neuro-Psychiatric Institute

Harold H. Kelley, Professor of Psychology, University of Minnesota

Gardner Lindzey, Professor of Psychology, University of Minnesota

R. Duncan Luce, Professor of Psychology, University of Pennsylvania

Robert B. MacLeod, Professor of Psychology, Cornell University

Daniel R. Miller, Associate Professor of Psychology, University of Michigan

Harry C. Triandis, Assistant Professor of Psychology, University of Illinois

Seymour Wapner, Professor of Psychology, Clark University

International Statistical Institute

Grants for attendance at the International Statistical Institute, to be held in Tokyo, May 30 – June 9, were awarded by the following subcommittee: Mortimer Spiegelman (chairman), Harold F. Dorn, and Douglas Greenwald. The 11 recipients of awards are:

George E. P. Box, Professor of Statistics, University of Wisconsin

William G. Cochran, Professor of Statistics, Harvard University

Robert Eisner, Associate Professor of Economics, Northwestern University

Harold Hotelling, Professor of Mathematical Statistics and Associate Director, Institute of Statistics, University of North Carolina

Abram J. Jaffe, Director, Manpower and Population Program, Bureau of Applied Social Research, Columbia University

John W. Kendrick, Associate Professor of Economics, George Washington University

Stanley Lebergott, Analytical Statistician, U. S. Bureau of the Budget

Geoffrey H. Moore, Associate Director of Research, National Bureau of Economic Research

Jerzy Neyman, Professor of Statistics and Director, Statistical Laboratory, University of California, Berkeley

Henry S. Shryock, Jr., Assistant Chief, Population Division, U. S. Bureau of the Census

S. S. Wilks, Professor of Mathematical Statistics, Princeton University

PUBLICATIONS

COUNCIL PUBLICATIONS

Theoretical Studies in Social Organization of the Prison, Pamphlet 15, by Richard A. Cloward, Donald R. Cressey, George H. Grosser, Richard McCleery, Lloyd E. Ohlin, and Gresham M. Sykes and Sheldon L. Mesinger. Papers prepared by members of a Conference Group on Correctional Organization, sponsored by the Council in 1956–57. March 1960. 152 pages. \$1.50.

The State and Economic Growth: Papers of a Conference Held on October 11–13, 1956, under the Auspices of the Committee on Economic Growth, edited by Hugh G. J. Aitken. May 1959. 399 pages. Cloth, \$3.75.

Migration and Mental Disease: A Study of First Admissions to Hospitals for Mental Disease, New York, 1939–1941, by Benjamin Malzberg and Everett S. Lee, with an introduction by Dorothy S. Thomas. Sponsored by the former Committee on Migration Differentials. March 1956. 152 pages. \$1.50.

Labor Mobility in Six Cities, prepared by Gladys L. Palmer, with the assistance of Carol P. Brainerd, for the former Committee on Labor Market Research. June 1954. 191 pages. Paper, \$2.25; cloth, \$2.75.

Effects of Social and Cultural Systems in Reactions to Stress, Pamphlet 14, by William Caudill. June 1958. 39 pages. 50 cents.

Social Status and Public Health, Pamphlet 13, by Ozzie G. Simmons. May 1958. 39 pages. 50 cents.

Problems in Intercultural Health Programs, Pamphlet 12, by George M. Foster. April 1958. 54 pages. 50 cents.

Special price for Pamphlets 12–14 together, \$1.00.

The publications of the Council are distributed from its office, 230 Park Avenue, New York 17, N. Y.

OTHER BOOKS

The Politics of the Developing Areas, edited by Gabriel Almond and James S. Coleman. Co-sponsored by the Committee on Comparative Politics and the Princeton University Center of International Studies. Princeton: Princeton University Press, March 1960. 608 pages. Cloth, \$10.00.

Leadership, Psychology, and Organizational Behavior, by Bernard M. Bass. Outgrowth of the Interuniversity Summer Research Seminar on Leadership and Group Behavior, sponsored by the Council in 1952. New York: Harper & Brothers, January 1960. 561 pages. Cloth, \$6.50.

Critical Problems in the History of Science: Proceedings of the Institute for the History of Science at the University of Wisconsin, September 1-11, 1957, edited by Marshall Clagett. Sponsored by the Joint Committee on the History of Science. Madison: University of Wisconsin Press, July 1959. 569 pages. Cloth, \$5.00.

Studies in Mathematical Learning Theory, edited by Robert R. Bush and William K. Estes. Stanford Mathematical Studies in the Social Sciences, III. Outgrowth of a workshop conducted at the Summer Institute on Applications of Mathematics in Social Science Research, 1957, sponsored by the former Committee on Mathematical Training of Social Scientists. Stanford: Stanford University Press, 1959. 440 pages. Cloth, \$11.50.

Theory of Value: An Axiomatic Analysis of Economic Equilibrium, by Gerard Debreu. Cowles Foundation for Research in Economics at Yale University, Monograph 17. Prepared with the aid of the former Committee on Mathematical Training of Social Scientists. New York: John Wiley & Sons, December 1959. 126 pages. Cloth, \$4.50.

American Teaching about Russia, edited by Cyril E. Black and John M. Thompson. Essays written as part

of the Review of Russian Studies, for the Joint Committee on Slavic Studies. Bloomington: Indiana University Press, February 1960. 189 pages. Cloth, \$4.50.

American Research on Russia, edited by Harold H. Fisher. Essays prepared for the Subcommittee on Review of Russian Studies, of the Joint Committee on Slavic Studies. Bloomington: Indiana University Press, September 1959. 254 pages. Cloth, \$5.00.

Trends in Content Analysis, edited by Ithiel de Sola Pool. Based on papers and discussions at a conference sponsored by the Committee on Linguistics and Psychology, February 9-11, 1955. Urbana: University of Illinois Press, December 1959. 250 pages. Cloth, \$7.50.

CROSS-CULTURAL EDUCATION MONOGRAPHS

These monographs, sponsored by the former Committee on Cross-Cultural Education, are published by the University of Minnesota Press, Minneapolis:

The Two-Way Mirror: National Status in Foreign Students' Adjustment, by Richard T. Morris. May 1960. c. 224 pages. Cloth, \$4.50.

In Search of Identity: The Japanese Overseas Scholar in America and Japan, by John W. Bennett, Herbert Passin, and Robert K. McKnight. December 1958. 381 pages. Cloth, \$7.50.

No Frontier to Learning: The Mexican Student in the United States, by Ralph L. Beals and Norman D. Humphrey. August 1957. 159 pages. Cloth, \$3.25.

Indian Students on an American Campus, by Richard D. Lambert and Marvin Bressler. December 1956. 133 pages. Cloth, \$3.00.

The American Experience of Swedish Students, by Franklin D. Scott. June 1956. 142 pages. Cloth, \$3.00.

SOCIAL SCIENCE RESEARCH COUNCIL

230 PARK AVENUE, NEW YORK 17, N. Y.

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